

NORTHFIELD BROOK LAKE
THOMASTON AND LITCHFIELD
CONNECTICUT

FOREST MANAGEMENT PLAN
MASTER PLAN APPENDIX B

AND

FISH AND WILDLIFE MANAGEMENT PLAN
MASTER PLAN APPENDIX D

Department of the Army
New England Division, Corps of Engineers
Operations Division
Waltham, Massachusetts 02254

January 1981

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For use of this form, see AR 340-15; the proponent agency is TAGO.

REFERENCE OR OFFICE SYMBOL

NEDOD-P

SUBJECT

Master Plans, Appendices B & D, Forest and Fish and Wildlife Management Plan, Northfield Brook Lake

TO

See Distribution

FROM

Chief, Operations
Division

DATE

21 May 1981
Mr. Mitchell/bp/305

CMT 1

1. The subject appendices, prepared in accordance with ER 1130-2-400, dated May 1971, has been approved by the Division Engineer.
2. The plan has been developed to increase the value of reservoir lands for recreation and wildlife, and to promote natural ecological conditions by following accepted conservation practices.
3. This plan has been developed in coordination with the Soil Conservation Service, U.S.D.A., Litchfield County, and the Connecticut Department of Environmental Protection.

Incl
as


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NEDOD-P

SUBJECT

Master Plan Appendices B and D, Forest and Fish
and Wildlife Management Plan, Northfield Brook
Lake

TO

Division Engineer

FROM

Chief, Operations Division

DATE

21 April 1981
Mr. Mitchell/kmf/306


CMT 1

1. Inclosed for your approval is the Forest and Fish and Wildlife Management Plan for Northfield Brook Lake. This plan will serve as Appendices B and D to the Master Plan for this project.

2. It has been prepared in conjunction with ER 1130-2-400, dated 28 May 1971. It has been reviewed by NED Planning, Engineering and Real Estate Divisions; and the Connecticut Department of Environmental Protection. Appropriate changes have been incorporated.

3. Division Engineers have been designated as approval authority for these plans by ER 1130-2-400. Information copies are to be forwarded to OCE upon approval.

Incl
as


ANDRELIUNAS

CF:
Operations Div File

TO: Chief, Operations
Division

FROM: Division Engineer

DATE:

CMT 2

APPROVED



DISAPPROVED





C. E. EDGAR, III
Colonel, Corps of Engineers
Division Engineer

NORTHFIELD BROOK LAKE
THOMASTON AND LITCHFIELD
CONNECTICUT

FOREST MANAGEMENT PLAN
MASTER PLAN APPENDIX B

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Department of the Army
New England Division, Corps of Engineers
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Waltham, Massachusetts 02254

January 1981

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Mr. Reese Morgan - Park Manager NRB

Mr. Robert Hanacek - Park Ranger NRB

Mr. Joseph Faloretti - Park Ranger NRB

Mr. Charles Freeman - Planning Division

Mr. David Wood - Engineering Division

Mr. John Mitchell - Operations Division

Mrs. Marriane Conway - Word Processing

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SECTION 1. INTRODUCTION

Purpose

The land and water resources of Northfield Brook Lake are valuable environmental assets to the people of the surrounding areas providing recreational opportunities, and conservation and protection of the resource within the project.

The purpose of this plan is to set forth guidance for the continuing wise management of the natural resources of the project, to enhance recreational and esthetic values, and to protect the environment. This plan identifies forest, wildlife and fishery resources, factors impacting on these resources, and sets out recommendations to carry out management objectives.

Authority

This management plan is authorized under ER 1130-2-400, dated 28 May 1971. It combines into one document the Forest Management Appendix B, and the Fish and Wildlife Management Appendix D to the "Public Use Plan for Reservoir Development," for the Naugatuck River Basin, September 1971.

Management Objectives

The objectives of this plan are to outline management practices which are compatible with flood control operations and multiple-use programs at Northfield Brook Lake, and provide for sound ecological management of forest, wildlife and water resources in the future.

Primary objectives are to protect and enhance esthetic and habitat values; provide for a variety of recreational uses of project natural resources, including hunting, fishing, day use, nature observation and interpretation; and where compatible provide forest products for project, national defense, and commercial purposes.

Coordination

This plan was coordinated with the Soil Conservation Service, U.S.D.A., Litchfield County, and the Connecticut Department of Environmental Protection. These and other agencies and interested groups will be consulted from time to time on the implementation of the plan.

SECTION 2. PROJECT DESCRIPTION

Location

Northfield Brook Lake is located in the towns of Thomaston and Litchfield, Litchfield County, Connecticut. The dam site is on Northfield Brook 1.3 miles above its confluence with the Naugatuck River in Thomaston. Access to the area is via State Route 254 from the north and south, and State Routes U.S. 6 and 118 from the east and west. The reservoir is within 2 miles of the intersection of State Route 8 north and south and U.S. 6. In 1978 the population of the county was 155,590 (est. from Connecticut State Register).

Acquisition

Northfield Brook Lake was authorized by the Flood Control Act, approved 14 July 1960, (P.L. 86-645, 86th Congress). Authorization for development and use of the reservoir area for public recreation purposes is contained in Section 4 of the Flood Control Act, approved 22 December 1944, as amended. Total area of the reservoir is 235 acres of which 208 acres are in fee, and 27 acres are held in flowage easement. Construction of the dam and appurtenant structures was completed in November 1965; recreation area facilities were completed in 1967.

General

Water levels are controlled by an intake weir, two manually operated sluice gates, and a 3-foot diameter conduit. The project functions as an automatic floodwater detention basin to lower downstream flood levels. The conservation pool behind the dam covers 8 acres at elevation 550 feet NGVD with a capacity of 82 acre feet. Spillway crest is elevation 576 feet NGVD, covering 67 acres with a capacity of 2,350 acre feet equal to 7.7 inches of runoff. Total drainage area is 5.7 square miles above the dam.

History

Much of the forested area in the Naugatuck Valley region was cleared by early settlers for farming and pasture in the early and mid-1600's to about 1750. The forest was further reduced in size and quality until about 1850 when agricultural use of the land began to decline. The advent of the portable steam sawmill in the late 19th Century brought about continued heavy cutting.

Increased reliance was placed on the forests as a source of raw material for many industries and expanding urban construction. Large areas were clearcut to support local iron and brass industries located in the valley and for fuelwood for domestic use.

Fire has played an important role in shaping the existing forest cover by scarring many trees thus reducing timber quality.

As agricultural use declined steadily between 1850 and 1960, a large majority of cleared land reverted back to forest. However, this trend has

stopped in recent years as lands are put back into agricultural production, subdivided for housing lots and for other uses.

Today there is a resurgence of the wood products industry in the state, as well as a rapidly growing demand for fuelwood. According to the most recent U.S. Forest Service resource survey, annual forest growth still substantially exceeds the amount removed. The possibility of significantly increasing wood production and utilization through sound management for a variety of benefits is receiving greater emphasis.

Present day land use of the reservoir area combines both machinery, manufacturing, chemical and metals industries in Thomaston and other towns along the Naugatuck Valley, and agriculture with crops produced mainly to support an important dairy industry.

Prior to acquisition and construction of the project in 1963-65, and the recreation area in 1967. The reservoir area itself was in a rural setting consisting of small lots, agricultural buildings and fields and wooded hillsides of predominantly mixed hardwoods with hemlock. In 1968, it was proposed to lease 180 acres to the State of Connecticut for recreation and resource management. However, this plan was not implemented due to problems with erosion and sedimentation from the unrestored borrow area (Tract 107).

All lands are under the jurisdiction of the Corps of Engineers and are open seasonally for a variety of public uses.

SECTION 3. PHYSICAL AND ECOLOGICAL CHARACTERISTICS

Topography

The reservoir is located in the southern part of the Western Connecticut Highlands which is an area of low, smoothly rounded drumloidal ridges. The woodlands generally occur on steep and stony or poorly drained soils.

The watershed above the dam is roughly rectangular in shape with a length of about 4.5 miles and a width of about 1.5 miles. The headwaters originate at an elevation of about 900 msl some 2 miles upstream and form Northfield Brook a mile above the dam in the old Northfield Pond at Elevation 685 feet msl.

The brook falls at a rate of about 125 feet per mile and forms a generally dendritic drainage pattern with many small, short tributaries flowing from steep slopes making the watershed very conducive to rapid runoff. Most of the forested and open areas have steep slopes ranging from 8 to 25 percent and 15 to 35 percent with generally northeasterly and southwesterly aspects.

Climate

The Northfield Brook watershed, located in the mid-reaches of the Naugatuck River Basin, has a humid continental climate, classified as a snow-forest type with warm summers.

Precipitation is spread evenly throughout the year averaging about 46 inches. Rain is often in the form of short intense downpours which, when combined with the steep slopes, leads to rapid runoff. Significant precipitation occurring during the growing season may lead to detrimental effects of trees when storm runoff is impounded to various elevations and durations during flood operations. Mean annual potential evapotranspiration range from 22 to 28 inches. Mean average runoff for the river basin at Beacon Falls is 25.9 inches or a little over 50 percent of the average annual precipitation.

The Naugatuck Basin is affected by three types of storms; continental, coastal, and thunderstorms. Continental storms move from the interior in an easterly and northeasterly direction and occur at fairly regular intervals. Coastal storms are of two types: tropical hurricanes and nontropical storms. Hurricanes are most likely to occur in August and September and may cause significant damage and flooding. Nontropical coastal storms develop along the east coast usually in the fall through spring months and may contain large amounts of precipitation. Thunderstorms normally occur during the summer months, are usually of short but intense duration, and may be accompanied by damaging high winds and hail.

The mean annual snowfall on the watershed is about 48 inches. However, snow accumulation is not usually very deep which contributes to frost heaves and injury to seedlings from dessicating winds.

The mean annual temperature at Waterbury is 50.2°F, with a mean maximum of 105°F and a mean minimum of -25°F. A January thaw period accompanied by heavy rains is common. This can lead to high rates of runoff from the frozen ground with significant flooding and severe damage to trees when the impounded water freezes as temperatures quickly fall.

The prevailing wind pattern is westerly but occasionally comes from the east and south during coastal storms. Wind and wave action in the lake have not had any significant effects on trees or on erosion along the shore. There is a potential for blowdowns of individual or small groups of trees particularly those on shallow slopes when they are laden with ice or snow, or when undermined by fluctuating water levels. Timber harvest operations will consider the potential effects of windthrow and mechanical damage on residual trees and maintain stand density for protection.

Geology and Soils

Litchfield County was subject to glaciation during the Ice Age or Pleistocene Epoch beginning approximately one million years ago. Glaciation modified the topography by rounding and smoothing bedrock, hills, and ridges, and covering them with a thin mantle of till. The principle evidence of the Late Wisconsin glacial period is stratified and unstratified drift. Extensive deep deposits of till and outwash in the Naugatuck Valley have been sources of commercially desirable sand and gravel for many years. Within the reservoir itself, bedrock consists principally of thinly foliated quartz mica schist, much injected with medium to coarse-grained granite.

The soils were formed from the overburden of variable loose to compact poorly sorted outwash and alluvial material. Two soil associations occur within the reservoir: the predominant Hollis-Charlton association and the Charlton-Paxton-Hollis association. These are upland soils that vary widely in the suitability for forest and wildlife management. A soil type map for woodland and wildlife habitat management is shown in Appendix B.

Terrace soils (Hinckley; Tisbury and Sudbury; Walpole and Raynham) occur above flood plain in the stream valleys on slopes of less than 15 percent. For the most part they are excessively to moderately well drained but can be poorly drained in some areas. They are mostly water-deposited beds of sand and gravel and often are overlain by loamy soil material. Permeability is highly variable between the types with a rather high water table which persists throughout much of the year. Natural fertility is generally low.

Upland soils (Charlton; Sutton; Leicester, Ridgebury and Whitman; Paxton; Hollis) occur above flood plains along mid and upper slopes to ridgetops. Generally they are moderately to well drained nonstony to stony soils on steep slopes. Large boulders and rock ledge outcrops are common. A seasonally high water table occurs due to a hardpan, (nonpermeable soil), 16 to 36 inches below the surface.

Borrow and fill land comprises the area excavated for project construction. It consists of loamy materials that are not classified into natural

soil groups. This type of land is variable in nature and onsite investigation is required for determining suitability or limitations for any planned use.

Forest Resources

Northfield Brook Lake is located in the northeastern part of the central hardwoods forest region of the United States immediately below the northern hardwood forest type. The predominant cover types are transition hardwoods: oak-hickory (Quercus spp - Carya spp.); beech-birch-maple (Fagus grandifolia - Betula spp. - Acer spp.); hemlock (Tsuga canadensis); with aspen-birch (Populus spp. - Betula spp.). The maple-ash-elm (Acer spp. - Fraxinus spp. - Ulmus spp.) type on wet sites, and white pine (Pinus strobus) types are also found here. The central hardwoods seem to be on a decline with the forest cover tending toward northern hardwood and hemlock types. A variety of conifers, mainly white pine, have been used with wildlife shrubs in planting open areas.

The forest cover is generally third generation and generally in the 40 to 60 year age class.

Stocking

Approximately 75 percent or approximately 160 acres is forested, i.e., land that is at least 16.7 percent stocked (contains at least 7.5 square feet of basal area per acre) by forest trees of any size or that formerly had such cover and is not currently developed for nonforest use.

Crown closure averages 70-80 percent with 100 percent in some stands. Most stands are composed of pole size (5.0" to 8.9" for softwoods and 5.0" to 10.9" for hardwoods) and small sawtimber (9.0" to 11.9" in diameter for softwoods and 11.0" to 13.9" for hardwoods).

Most stands are approaching a fully stocked level. However, site utilization by acceptable growing stock is low to moderate due to the large amount of competing undesirable growing stock and cull trees.

Natural advance regeneration of desirable species is adequate, predominantly sugar and red maples and hemlock, with an often moderate to dense shrub understory. Artificial reforestation, mainly with conifer seedlings, was conducted during the 1970's for erosion control purposes.

Quality of Growing Stock

The overall quality of growing stock is fair to poor. Though climatic conditions for forest productivity are potentially very favorable, soil limitations and intense vegetative competition reduce growth potential. The lack of past silvicultural management, effects of insects and mechanical (flood/wind/ice) damage are major contributing factors to low stand quality and productivity. Increased harvesting is needed to remove unacceptable stock and to improve growing conditions for desirable species in the residual stand.

Forest Inventory

A preliminary quick reconnaissance inventory cruise was conducted in 1975 to determine total board foot volume with observations made on the stand conditions. Approximately 113 acres were inventoried without delineation of the area into compartments and stands. Sample points were set out in a systematic grid pattern based on a 5 percent intensity using the point sample method, 10 BAF prism. Only trees over 10 inches diameter breast height (dbh) were tallied (variable sawlog top to 8 inches diameter outside bark).

A second more detailed inventory was made in 1979 for compartments I and IV. Data collected for each stand included: cover type; board foot volume of growing stock and cords for cull trees; basal area per acre; site index; percent stocking and general comments on operability, understory, and wildlife habitat etc. Recommendations were made that will be used in preparing management prescriptions.

Prescriptions

A record for each compartment will be maintained. This record will contain a large scale map of the compartment (1:50 to 1:100) showing any subcompartments, compartment and project boundaries, normal and flood pool elevations, and other major identifying features. Management work accomplished by date and location will be recorded for each compartment, i.e., plantings, timber stand improvement, inventory work, etc., along with related photographs, maps, tables, etc.

Management recommendations will be updated on a five year cycle. This prescription will include the compartment's location, an adequate description of the physical and biological resources of the area, vegetative cover type, soil conditions, uses of the area, and other pertinent considerations. Management needs for a five year schedule will then be listed, i.e., succession control mowing, fire roads, thinnings, tree and shrub plantings, boundary maintenance, and a public fuelwood cutting program.

Open Land

Open areas comprise approximately 50 acres or 25 percent of the reservoir and consist of the dam site developed recreation area, old fields, a powerline right-of way and borrow area. At present, only the developed recreation area has been maintained regularly through mowing and the powerline right-of-way through herbicide application. Some succession control mowing and clearing has been initiated for wildlife habitat management. There are no agricultural or grazing leases.

Pioneer species of shrubs and trees are encroaching on most of the remaining fields. Open area management will be a major consideration.

Wildlife and Wildlife Habitat

Factors limiting wildlife habitat appear to be the small size of the reservoir, impact of frequent flood impoundments on lower portions, and a deficiency of adequately diverse and dispersed cover and food in upland areas. In areas where adequate food sources are present, cover is sparse, particularly for wintertime requirements.

Wildlife species may be classed as "farmland" types that have populated the area as a result of past land use practices. The wildlife of the region are well adapted to farm and residential environments and tolerant of man. They require a good balance and mix between forested and open land. The ratio of wooded area to open land is high (3:1) but does provide for an adequate edge effect to support several upland game species, predators, and a variety of nongame birds and mammals.

Reforestation of abandoned field areas has had a negative effect on reservoir wildlife. Loss of these open areas will further decrease the wildlife carrying capacity of the project.

Mast production in older oak stands has decreased with the loss of many of these trees due to repetitive gypsy moth defoliation. Throughout the area oaks are on the decline and are being replaced by other species.

White tail deer frequent the reservoir lands moving in from adjacent farms and woodlands. No evidence of deer yarding in winter is present.

Unlike other Naugatuck River Basin reservoirs, the State has not stocked ringnecked pheasants for the fall hunting season. Lack of suitable habitat, low hunter pressure and inadequate vehicular access for stocking are primary reasons for this.

Northfield Brook Lake lies enroute to the Atlantic flyway for many migratory waterfowl and hawks. Lack of emergent vegetation for food and cover, and the unpredictable water level in the spring and fall discourage all but occasional use by waterfowl. A lack of wetland areas along the water courses virtually eliminates suitable waterfowl nesting and brooding sites (see Plate 1). Some furbearers, mainly muskrat, inhabit the reaches of the brook upstream of the lake. No evidence of beaver has been observed. Limiting factors are a lack of a wetland (marshy) type habitat and streambank characteristics.

The following is a partial listing of typical area species. Target species for wildlife management practices will be selected without regard for their status as nongame or game.

White Tail Deer	<u>Odocoileus virginianus</u>
Beaver*	<u>Castor canadensis</u>
Red Fox	<u>Vulpes fulva</u>
Raccoon	<u>Procyon loter</u>
Eastern Cottontail Rabbit	<u>Sylvilagus floridinus mallurus</u>
Muskrat	<u>Ondatra zibethica</u>
Mink	<u>Mustela vison</u>
Ruffed Grouse	<u>Bonasa umbellus</u>
Mallard	<u>Anas platyrhynchos</u>
Canada Goose	<u>Branta canadensis</u>
Wood Duck	<u>Aix sponsa</u>
Black Duck	<u>Anas rubripes</u>
Great Blue Heron	<u>Ardea herodias</u>
Snapping Turtle	<u>Chelydra serpentina</u>
Box Turtle	<u>Terrapene carolina carolina</u>
Osprey*	<u>Pandion haliaetus</u>

Information on research and experimentation of management practices for game species is generally more available than for nongame species. The use of any game management practice will generally improve an area for nongame wildlife species as well. Nonconsumptive as well as consumptive users will benefit from game management practices.

A program to increase winter cover through understory plantings, specific cutting practices, maintaining open area and planting perennial and annual food plants for all seasons would increase both the number and variety of species present.

Pesticides

To date, there has not been a need for an application program for control of insects or other vectors. However, threats from new cycles of gypsy moth populations may require spraying or other treatments for preservation of valuable shade trees.

Herbicide applications have been a regular program to control undesirable grass, weed and brush growth along roadsides in picnic areas, and primarily on the rock slopes of the dam and spillway. Ammate, dalapon, 2,4-D, and simazine have been the chemicals applied in recent years, with amitrol used for spot treatment of poison ivy. Some, such as silvex which contains 2,4,5-T and dioxin, have been suspended by the EPA and are no longer in use.

As regulations on the use and training of pesticide applicators have become tighter, future applications will be granted under a service contract by applicators licensed by the state. Registered chemicals, that are safe for use around water areas and fishlife will be specified and the contract applications closely monitored. The pesticide program is reported annually in accordance with ER 1130-2-413. Alternative methods to chemical controls of vegetative growth forest infestations, and other pests will be considered and implemented when proven to be effective and practical.

*Species are rare in immediate reservoir area.

SECTION 4. FOREST MANAGEMENT

Objectives of Forest Management

The objectives of management are to increase the health and value of forest lands for recreation, wildlife habitat, esthetics and watershed management through application of sound silvicultural practices. The forest resource will also require protection from insects, diseases, fire and overuse.

Management Needs

During the life of this plan problems related to reservoir management will occur. These problems will mainly be:

- a. Establish and maintain desirable forest cover in recreation area. There is a need for forest cover to serve as shade, esthetics, screening buffer, erosion protection and wildlife cover.
- b. Select those open areas which should be reforested and replanted with desirable timber and wildlife species.
- c. Promote species diversity through plantings and cutting practices.
- d. Protect steep banks from erosion.
- e. Establish and maintain habitat for game and nongame wildlife.
- f. Protect heavy use areas from site deterioration.
- g. Reestablish vegetative cover on areas denuded by overuse and/or high water.
- h. Protect representative areas of natural cover types and large or unique trees for the enjoyment of present and future generations.

Forest Land Classification

Forest covers about 75 percent of the reservoir area. The remaining 20 - 25 percent, including the 8-acre lake, is in open fields, powerline R.O.W.'s, the developed recreation area and former borrow area. The forest timber is noncommercial due to terrain and soil conditions. Many of the old homesites and fields are reverting to brush and will return to forest if left unmanaged.

Forest Compartments

The reservoir area is divided into five compartments to ease administration, preparation of prescriptions and records keeping. These compartments have been designated according to present use, size, and ease of identification of natural and artificial boundaries in accordance with ER 1120-2-400. When preparing prescriptions, compartments may be further divided into subcompartments on the basis of vegetative cover, location, primary use, etc., when justified.

Compartment I (61 acres): Reserve Forest Land (Wildlife Management)
Compartment II (38 acres): Reserve Forest Land (Wildlife Management)
Compartment III (23 acres): Recreation-Intensive Use
Compartment IV (64 acres): Reserve Forest Land (Wildlife Management)
Compartment V (22 acres): Project Operations

Prescriptions

A variety of practices are needed to meet the management objectives stated above. The intensity and extent of practices applied will be justified by the primary land uses of each compartment.

Reserve Forest Land (Wildlife Management)

These areas (Compartments I, II and IV) comprise most of the reservoir and are allocated for vegetation control and improvement to support management objectives, primarily protection and conservation, wildlife habitat, low density recreation, and erosion control.

a. Regeneration Standards. Natural reproduction will serve as the major means of regeneration to perpetuate native species. Stands with a variety of species and age classes will be encouraged. Species adapted to various growing site conditions will be favored in choosing silvicultural management practices.

Artificial regeneration, i.e., planting and seeding, will be used only for specific purposes, such as erosion control, wildlife food and cover, and for flood tolerant species.

Artificial regeneration will primarily use transplants, either from reservoir areas, or from the Connecticut State Forestry Nursery, Voluntown, or private nurseries. The state nursery will be the primary source of planting stock for reforestation and wildlife plantings. These plants are available as one year nursery seedlings (1-0 stock) in a limited number of conifer, hardwood and shrub species. Plantings will be conducted in such a manner as to produce a natural appearance.

The use of mechanical and/or chemical measures are justifiable on these lands for site preparation, to promote survival rates and vigor, to control competition, to slow succession in selected areas and to promote more species variety. The use of fertilizers, mulches and watering will not normally be justified on these lands.

b. Cultural and Tree Removal Standards. In established and new stands the following timber stand improvement (TSI) standards will apply:

Pruning is an expensive treatment and will be limited to individual trees or specific stands of high value for utilization, recreation, wildlife, and to

eliminate obvious safety hazards. Girdling of large trees may be justified in certain cases to release the understory or facilitate tree removal.

Intermediate cuttings will be used on these lands and include thinnings, release cuttings, improvement cuttings, and salvage and sanitation cuttings. Regeneration cuttings of mature trees on a single tree or small group selection may be used to produce uneven aged stands. Clearcuttings in small one-quarter to one-half acre blocks may be prescribed for habitat improvements. Slash should be lopped close to the ground to increase decomposition, chipped for mulch, or stacked in scattered small piles for wildlife cover. Large dead trees should be left where practical along water courses and in the impoundment zone where they provide needed anchorage on slopes and serve as den trees.

On reserve forest lands, cuttings may be prescribed for one or more of the following purposes:

1. Clear sites for developments, such as access roads, fire breaks, trails, and boundaries.
2. Create vistas.
3. Control insect and disease infestations.
4. Improve esthetics.
5. Improve wildlife habitat through varying basal area and tree composition.
6. Remove safety hazards and flood and fire killed trees.
7. Improve stand vigor with thinnings, release and regeneration cuttings.

A number of factors will be considered in each stand before a removal operation: erodibility of soils, location of water courses, management objectives for the compartment, health of the stand, species to be regenerated, esthetics, and effect on residual stand.

Methods of disposal of timber resources are discussed later in this Section.

c. Protection Standards. Measures required on reserved forest lands to preserve the resources are: control of unauthorized use, fire control, erosion control, insect and disease control, and regular reconnaissance inspections.

Control of unauthorized use includes active measures to prevent vehicular access (barricades, obliteration of unnecessary roads, and signing), regulation and control of agricultural and timber trespasses, boundary inspection and maintenance.

Fire has not been a significant problem at Northfield Brook Lake to date. Applicable fire protection measures are discussed further below.

Protective measures will include development of management access roads, clearing of fire hazards, coordination with the state fire warden, and regular patrol during the peak fire season.

Erosion has been a significant problem in the reservoir. The major sources of sediment have originated from off-reservoir sources and the old borrow area. Prompt action is needed at the source using accepted conservation measures (grading, diversions, revegetation, control of overuse, mulching, regular inspections, etc.).

Recreation - Intensive Use Lands

These lands (Compartment III) were acquired for project operations and are reserved for administration use, and intensive recreational development and activities. The areas lie within the main flood impoundment zone and receive the greatest impact from visitation. Intensive grounds maintenance and arboricultural practices are required here to protect the soil and vegetative cover, improve esthetics, provide a pleasing outdoor recreational setting and where practical, improve wildlife habitat.

a. Regeneration Standards. Use of sapling size tree planting stock, along with shrubs, is justified on these lands for individual and small group plantings. Species adaptable to various site conditions and intensive recreation use should be considered for screening, erosion control, shade, growth rate and durability.

Where possible and to reduce costs, sapling and shrub transplants will come from Corps lands. Selected plants should be root pruned the growing season prior to being removed and replanted the following spring. Mechanical and/or chemical site preparations and fertilizer, mulch and watering treatments are justified in these areas to improve survival and growth rates.

One or two year old seedlings (1-0 or 2-0 stock) for buffer screenings, erosion control and habitat improvement will be mixed when planting to provide a heterogeneous stand and lessen the potential of insect and disease attacks. Larger scale plantings of seedlings should be in an irregular manner to produce a natural appearance with a maximum edge effect for wildlife. Openings should be left for planting with shrubs, grasses and trees with big wildlife food value or left in a natural state.

Use of disking, mowing, clearing, stump treatments, and minimum herbicide applications, such as Ammate and Simizine, are treatments justified on these lands for site preparation and to control competition.

b. Cultural and Tree Removal Standards. Environmental and public use factors have significant impacts on the project resources, particularly on these intensive recreation use lands. The following standards will apply to established or new individual trees or stands in these lands.

Due to the intensive use and recurring flooding, regular fertilization and aeration is required. Annual inspections by management personnel will be performed to determine treatment needs.

Pruning of trees will be a regular practice where needed for access, improved visibility, safety, appearance and maintenance of vigor. Pruning will not be used for the purpose of improving timber quality.

Sanitation cuts and timber stand improvements can be carried out, especially on less intensively used areas, for general recreation, esthetic, wildlife and timber values.

Mechanical methods for control of woody or herbaceous growth will be favored over chemical methods. Chemical spraying should be used only for reasons of public protection, such as use of Amitrole for poison ivy, for preservation of individual valuable shade trees, or where mechanical means are not practical. Applications should be on a very selective basis using spot treatments.

Selective cutting may be used to accomplish one or more of the following purposes:

1. To clear sites for developments such as roads, trails, parking areas and new picnic sites.
2. To create vistas.
3. To control insect and disease infestations.
4. To meet needs requirements for access, safety, esthetics, air circulation/drying, utilities, etc.
5. To remove dead, damaged, or less adaptive trees while favoring or planting appropriate species.

Cutting in recreation areas should be kept to a minimum and for specific reasons. Regeneration would be difficult to establish here due mainly to inundation from impoundments. Tree removal should be carried out primarily in the fall through early spring period. For esthetic and safety reasons, stumps should be left at ground level. Wood produced should be given to the public or utilized by the Corps according to policy. Slash should be quickly disposed of or chipped for use as mulch.

c. Protection Standards. Adverse impacts on these lands from recreation and vehicle uses and impoundments pose the most serious management and maintenance problems on the project and threat of deterioration of the resources.

Control of vehicular and pedestrian access is the key to protecting the resource. Natural barriers should be favored, such as tree and shrub plantings or readily available large boulders arranged to exclude traffic or direct it away from fragile or damaged sites. Manmade devices such as signs, gates and barriers should be kept to a minimum and made to blend into their surroundings. Regular patrol and inspection is very important to limit undesirable access and use.

Intensive grounds and tree maintenance practices are justified on these areas. Common measures include thinnings to increase sunlight, fertilization, soil aeration, mulching, etc. This will tend to reduce the effects of overuse and help prevent serious results of site deterioration - soil erosion and insect and disease outbreaks. On permanent picnic sites, the immediate surrounding area should be reinforced using a timber or concrete curb type island with a sand, stone or mulch chip bedding. Grounds maintenance work may be incorporated into the seasonal mowing contract.

Areas showing signs of site deterioration and erosion will receive prompt maintenance attention. Control of access, reseeding and mulching will generally be adequate for protection. More serious gully and sheet erosion will be treated by grading, filling, and regular soil conservation measures. On areas where traffic is constant or cannot be readily diverted, artificial surfaces should be considered such as bark chips, bituminous pavings, or wood steps.

Plants and vegetative cover will be maintained in a vigorous and fast growing condition to prevent infestations. Many of the trees and shrubs and much of the turf on these lands are presently growing under stress conditions which often leads to insect and/or disease attacks. Regular inspections are required to detect problems.

Project Operations

These lands (Compartment V) comprise the major flood control features of the project - the dam and spillway. Management measures will encompass esthetics, control of insects, diseases, fire and erosion problems.

a. Regeneration Standards. Forest covers approximately 10 percent of this area. Vegetation must be kept under control around the flood control facilities. Natural reproduction (coppice sprouting and seeding) will be the means to regenerate the existing cover. Species better suited to site and environmental conditions will be favored in prescribed silvicultural practices.

Artificial regeneration using transplants of trees and shrubs will be used on a selective basis for specific purposes, e.g., landscaping, buffer strips, and erosion control. Some minimum opportunity exists for border area wildlife plantings.

Application of mechanical and/or chemical measures are justifiable on these lands generally only to control competition and remove undesirable vegetative growth from riprap slopes, roadsides, etc. The use of fertilizers, mulches and watering are generally justified on these lands.

b. Cultural and Tree Removal Standards. Pruning of trees will be limited to the elimination of obvious safety hazards. However, landscape plantings should be pruned periodically to improve appearance and maintain vigor.

Tree removal will improve esthetics, remove debris and hazards, control infestations, encourage species better suited to growing site conditions, and salvage usable wood products.

c. Protection Standards. Accessibility of these lands by the public is limited. Adequate patrol and barriers are needed to control off-road vehicle use.

Prompt regrading and revegetation of slopes worn or eroded by impoundment drawdowns and unauthorized vehicle use will be required to reduce accelerated erosion.

Infestations, particularly the gypsy moth, have been a long term recurring problem on the predominantly oak-hickory stands. General protective measures will be regular removal of accumulations of severely damaged and dead trees and slash. Access is difficult for fire suppression and harvest operation requirements. Access to remote portions of these lands on the east side of the dam is available from adjacent reserve forest land areas for fire suppression and cutting operations.

Fire Control

A separate Fire Protection Plan, Appendix C, was prepared in 1975. It provides general information of fire protection requirements and measures for project buildings and lands. Fires have played an important role historically in the woodlands of the reservoir area. The critical fire season occurs just before the spring "green up" period. Large accumulations of damaged and dead trees add to the potential fuel source for woods fires.

Measures to increase protection will be to construct a system of multiuse roads, fire breaks and trails. Regular cuttings and clearings of damaged trees and slash will reduce the accumulation of fuels. Frequent patrols during peak fire season will aid in fire prevention.

Insect and Disease Control

Forest cover at Northfield Brook Lake is primarily the oak-hickory central hardwood and mixed hardwood types with an increasing tendency to hemlock in some areas. Lack of management and protective measures in the past have increased insect infestation and significantly reduced tree quality in many stands.

The important insects and diseases having a current or potential impact on the major tree species in the region are:

a. Insects

Gypsy moth (Porthetria dispar). Preferred species are oak, apple, aspen, birch, linden, and willow. Mortality from repeated defoliations has been great. Continued defoliation reduces growth and vigor of surviving trees leading to increased susceptibility to insect and fungi attacks and fire damage. Heavy repeated defoliations occurred in the early 1970's and may recur in the early 1980's.

White pine weevil (Pissodes strobi). In descending order of preference, its most commonly attacked hosts are: eastern white pine (most serious), Norway spruce, jack pine, Scotch pine, pitch pine, red pine and certain other native and introduced conifers. Attacks are through the previous year's terminal shoots.

Hemlock looper (Lambdina fiscellaria fiscellaria). The looper may defoliate hemlock and sometimes cause local or sporadic mortality. Outbreaks may occur very suddenly; the most serious ones in mature and overmature hemlock and balsam fir stands.

Japanese beetle (Popilla japonic). The beetle is an introduced species that goes through frequent recurring population buildups. It feeds on foliage of a wide variety of plants. Many species of forest and shade trees may be defoliated, particularly Japanese and Norway maples, horsechestnut, sycamore, gray birch, walnut, Lombardy poplar, basswood mountain ash, and elm.

Fall cankerworm (Alsophila pometaria). Preferred hosts are elm and apple, with other hardwoods, such as hickory, ash, maple, beech, basswood, cherry and the oaks, being secondary choices. Young larvae skeletonize young leaves at the tips; older ones eat all but the midribs or larger veins of leaves. The cankerworm is an important pest of forest and shade trees with outbreaks occurring periodically, sometimes infesting large forested areas.

Forest tent caterpillar (Malacosoma americanum). Favored hosts are sugar maple and aspens, along with apple and cherry. Young larvae feed on expanding buds; older ones devour foliage, often defoliating the host tree. Mortality after heavy defoliation is not usually severe but can result in reduced increment growth and quality of products derived from the tree.

Saddled prominent (Heterocampa guttivitta). Beech, birch and sugar maple are its preferred hosts, but during major infestations it will feed on most other hardwoods, particularly oaks and poplar. Young larvae skeletonize the upper surface of leaves; older ones eat the entire leaf except principle veins. Considerable mortality has occurred in areas receiving two consecutive years of defoliation.

b. Diseases.

Anthraxnose (Gnomonia spp., Gloeosporium, spp., and others). On hardwoods, various causal fungi produce a variety of leaf spots which appear as dead areas on leaf surfaces. The fungi infect the host's leaves in the spring and may become severe after very wet springs with occasional complete defoliation. It is generally not of concern in forests but control may be desirable on individual valuable shade trees.

Oak wilt (Ceratocystis fagacearum). This fungus affects all species of oaks, particularly red oaks, and continues to be a problem in the region. Infection can spread through grafted root systems of trees or be transmitted by spores. Symptoms spread rapidly with dieback starting at the top of the crown and moving downward.

Root rot (Fomes annosus). This disease is important to most conifers, especially red pine plantations, and particularly after thinning. Infected trees are likely to have a thin unhealthy crown; others die too quickly to show noticeable symptoms. Root graphs are primarily responsible for disease spread. Site and environmental conditions are critical in development and degree of impact of disease. Bark beetles often attack fungus-weakened trees.

Nectria canker (Nectria spp.) One or more species of Nectria attack many species of hardwoods, particularly trembling and bigtooth aspen, white, yellow and black birches, basswood, black walnut, American elm, red and sugar maples, and red and white oaks. Cankers developed on the main stem reduce the value and productivity of the stands and subject trees to wind breakage. They also serve as openings for entrance of wood-rotting fungi.

c. Control. Basic measures to control infestations in the reservoir will include maintaining tree species vigor and diversity. On forest lands, silvicultural practices will be applied to promptly remove damaged, overmature and severely infested trees; TSI measures such as pruning, thinning and harvesting; protection from fire; selective cutting and reforestation with tree species better suited to site conditions; and balanced spacing of trees within the stand to improve growth rate, sunlight penetration and aeration.

More expensive chemical and mechanical control measures are justified on individual shade trees in recreation and administrative areas. These include: pruning, crown and stump spraying, wound treatment, injections, slash removal and soil aeration.

Boundary Maintenance

Northfield Brook Lake was surveyed and monumented under contract in 1979. A regular boundary marking and maintenance program is an important part of resources management and protection.

Visual inspections of all boundaries should be made over a period of two years or less. Lines will be marked when and where necessary with standard signs (#M-3), paint and vegetative plantings.

An original record with maps will be maintained at the basin office showing marking and maintenance completed and listing monuments that have been damaged or are missing. Schedules can then be made for continuing maintenance and contracting of services to reset monuments.

Timber Sales

Timber sales will be conducted in accordance with ER 405-23-912. Funds received from the sale of wood products may be returned to the project appropriation for expenditure. Minor sales may be accomplished informally by the basin manager. Such small sales of fuelwood timber and other products is an effective way to accomplish TSI, sanitation and general clearing work.

Sales will be coordinated with Operations Division and carried out under Real Estate Division procedures. Timber harvests for these sale proposals will include: a location map, area and stand descriptions, objectives, volume estimates, wildlife and environmental considerations, fire control and safety, and fiscal considerations (estimated value, performance bonds, payment schedule, bidders list).

Consideration should be given to combining sales with other nearby reservoirs to increase the total quantity offered and enhance attractiveness to potential buyers. Sale proposals should be coordinated with the Regional State Forester for guidance on volume and grade estimation, special consideration, market, bidders, and value determination.

After approval of this plan, a series of sales for TSI objectives will be developed.

Public Fuelwood Cutting Program

A public fuelwood program (NED Form 701) has been implemented and will help satisfy the demand for wood energy while accomplishing resource management objectives in forest stands. Also, flood debris in accessible areas may be economically removed using the permit program. Wood will be available free or at nominal charge. The needs of the resource are to be given priority over the demand for fuelwood.

SECTION 5. AQUATIC MANAGEMENT

Aquatic Resources

Habitat. There are two types of distinguishable aquatic habitats in the reservoir: the brook habitat with its short steep tributaries; and the impoundment of the eight acre conservation pool. Maximum depth of the lake is 22 feet at the intake structure; average depth overall is about 10 feet.

Northfield Brook is a locally important trout stream and receives moderate angling pressure. The brook environment covers 0.6 miles within the project with a moderate slope. Hemlock-lined streambanks provide important shading to moderate water temperatures. Natural reproduction of the areas preferred sport fish, trout, is rare within the reservoir but may occur in upstream feeder streams. Put-and-take stocking by the State of brook trout, Salvelinus fontinalis; brown trout, Salmo trutta; rainbow trout, Salmo gairdneri, meet some of the demand from area fishermen. The absence of wetland zones severely restrict spawning areas for fish populations, or provide habitats for other wetland wildlife species. The potential for developing natural sites with artificial measures is very limited due to the soil and site conditions which occur.

The lake has some potential as an intensively managed trout pond. However, critical factors having a negative impact are adverse water quality conditions, fluctuating water levels, sedimentation, frequent occurrence of complete drawdown, and lack of rough fish control. Water quality parameters, primarily temperature, dissolved oxygen, pH, and total hardness, have generally been acceptable but on past occasions have degraded to levels adversely affecting conditions required by trout.

A warm water fishery occurs naturally in the lake. The source of the population come from upstream, off-reservoir ponds. Their access is made easier during times of high water.

Warm water species present are:

Largemouth bass	<u>Micropterus salmoides</u>
Brown bullhead,	<u>Ictalurus nebulosus</u>
Creek chub,	<u>Semotilus atromaculatus</u>
Black crappie,	<u>Pomoxis nigromaculatus</u>
Blacknose dace,	<u>Rhinichthys atratulus</u>
Longnose dace,	<u>Rhinichthys cataractae</u>
Tessellated darter	<u>Etheostoma caeruleum</u>
Yellow perch	<u>Perca flavescens</u>
Chain pickerel	<u>Esox niger</u>
Common shiner	<u>Notemigonus crysoleucas</u>
Sunfish (various)	<u>Lepomis</u> spp.

The lake also has potential as an improved warmwater species fishery supporting largemouth bass.

The small lake does not possess fish populations or the potential, even under intensive management, to support commercial fishing. Current and managed future populations would support only moderate sports fishing pressure.

Aquatic Weeds

Aquatic weeds have not been a problem in the lake. Small algal blooms have occurred in the early 1970's due to the inflow and settling out of sewage pollution along with the buildup of organic material. Chemical control measures have not been necessary for weed and algae problems. However, the lake has been drained on two specific occasions in the early 1970's to allow for removal of septic conditions and the related potential for undesirable weed and algal growth.

Fish Management

Aside from the put-and-take State trout stocking program, the fishery at Northfield Lake is essentially warm water. However, it does have some potential as an intensively managed trout pond if certain critical factors prove favorable and practical. These major factors are water quality maintenance within required tolerances, control of warm water fish populations, improvements to upstream habitat and spawning areas, periodic lake bottom reclamation, and limitation of the effects of flooding. An artificial barrier at the brook upstream of the lake would need to be constructed for control of the influx of warm water species. Stocking with rainbow trout fingerlings in the fall could then be initiated, supplemented by normal trout stocking. A trout fishery then may remain suitable for about five to six years after which time it may be necessary to drain the lake, reclaim and start the cycle again.

Unless it is determined to be both practical and desirable to manage intensively for trout in the future, the lake will be managed for warm water species, primarily large mouth bass. Artificial habitat improvements in the lake, such as fish attractors, snags, and large boulders will be installed to increase cover, along with fall drawdowns of the lake to increase bass predation of rough fish. Annual stocking of trout in the lake can continue without detrimental effect.

The upstream brook habitat will be managed in an effort to increase the existing limited holdover trout population. Applicable measures in this short 0.6 mile reach include maintenance of shade cover along the banks, and channel bed modifications to increase riffles and spawning sites.

Attempts to control rough fish through fishing derbies will be encouraged.

Creel census methods, gill netting or electro-shocking would be appropriate from time to time to determine species, age, size and health of the fish population and evaluate the overall effectiveness of management measures. Records of lake profile surveys of water temperature, dissolved oxygen content and other parameters will be obtained from the NED Hydraulics and Water Quality Section and maintained in the working papers record.

Water Quality

The State of Connecticut has designated Northfield Brook Lake a Class A stream, described as "suitable for water supply and all other water uses; character uniformly excellent." The NED Water Quality Lab has conducted a regular sampling and testing program since 1970 at collection points for the inflow, the lake and the outflow.

An anaerobic condition developed in the lake in 1972 that threatened continued public use and the fishery. The cause was attributed to a gradual buildup of sewage sediments from various domestic sources upstream with increased biochemical oxygen demand through the lake profile. Other contributing factors were increased sedimentation/turbidity from erosion from the unrestored borrow area ; low inflow/aeration in the summer; and surface water discharges over the intake weir. Basically, the lake served as a settling basin for the watershed. The lake was drawdown, the bottom examined, and the accumulated deposits removed in the spring of 1973. The upstream pollution source has been corrected. Other measures taken to maintain acceptable water quality have been: a). additional removal of deposits; b). sealing of the vault chemical toilets at the beach during the off-season and prior to impoundment operations, and frequent pumping of the vaults; c). restoration of the borrow area on Tract 107 to control a major source of sediment; d). and periodic opening of the channel gate at the weir in the summer to permit discharge of water from the bottom. Reservoir and upstream watershed areas will be monitored to locate and report sources of pollution and erosion that adversely affect the water resources of the project.

In addition to regular sampling, the NED WQ Lab has started periodic lake profile sampling. This program should be continued to better evaluate changes in WQ as they effect the fishery as well as recreational use and to help determine any improvements from management efforts.

The results of a lake profile sample completed on 25 August 1980 at the deepest part of the 8-acre lake¹ were:

STATION #NB05

<u>Depth</u> <u>(Ft)</u>	<u>pH</u> <u>(Units)</u>	<u>Cond.</u> <u>(UMHOS)</u>	<u>D.O.</u> <u>(PPM)</u>	<u>Temp.</u> <u>(°F)</u>	<u>Turb.</u> <u>(FTU)</u>
1	6.82	56	9.11	72.2	2.9
3	6.72	57	8.77	73.2	---
5	6.68	54	8.06	69.7	---
7	6.63	56	6.99	68.6	---
9	6.52	56	6.33	67.3	---
11	6.59	66	2.74	64.5	---
13	6.46	77	2.16	60.7	---
15	6.37	108	1.91	57.1	---
17	6.38	165	1.76	54.3	---
19	6.42	196	1.70	53.9	36.0*

*Increased turbidity on bottom due to removal of beaver dam upstream above reservoir.

¹Pool stage 22.6 feet

SECTION 6. WILDLIFE MANAGEMENT

General Statement

The objective of the Corps' wildlife management program will be to provide for the greatest diversity of species indigenous to the surrounding area and compatible with the operation of a flood control project. One management objective will be the wildlife resource contributing the greatest good to the most people over the longest time. Nonconsumptive uses of wildlife, such as sightseeing and photography, will receive equal consideration with that of consumptive uses, such as hunting. Vegetative and water level manipulation will be the principle methods of fish and wildlife habitat enhancement, and will be consistent with other joint uses and basic physical limitations at Northfield Lake.

An increase in vegetative diversity and dispersion by age, class, species, height and density to provide cover, food and edge effect in all project compartments will increase area wildlife diversity.

Timber Stand Improvement (TSI) will be conducted to release and favor trees which produce food for wildlife or provide cover or nesting cavities, and to promote the health, vigor and esthetics of the forest itself. Examples of forest manipulation for wildlife management will be selective thinning to produce uneven-aged stands, release cutting of coniferous species, preservation of den trees, thinning of trees with little wildlife value in favor of other species, and small block clearcutting to create more productive open land. Trees with unsound limbs or trunks should be pruned for public safety in developed recreation areas.

Wildlife Habitat Lands Management Practices

Eight general land management practices are listed here which may be used to develop or maintain wildlife habitat. Soil type, topography, elevation, size of area, access and land use will determine which practice or combination of practices will be used. Final determination or recommendation will be made by the park ranger. Land units have been divided into compartments and subcompartments with a management prescription to be made for each. Compartment prescriptions will be updated completely every five years by the park ranger. Working papers for all management work will be maintained at the basin office. Annual work plans will be completed for each calendar year including cost estimates, and possible suppliers and contractors. Seed varieties and mixtures, and planting methods and dates, will conform to recommendations provided by local representatives of the Connecticut Department of Environmental Protection, the University of Connecticut Agricultural Extension Service, or the U.S. Soil Conservation Service.

Maintaining existing open and semiopen acreage through various cultural practices is a primary objective of the wildlife management program. Borders of intensively used recreation lawn areas can be maintained for increased edge effect and planted to support additional habitat. However, due to the small size of the reservoir, existing forest cover, site conditions and land uses the

opportunities for extensive open area management and other standard habitat improvement practices, such as food plots, strip plowing, and subimpoundments are very limited.

Prescriptions will list the recommended land management practices for the compartments. The eight applicable practices are:

Practice #1. Developed recreation area use. Wildlife habitat enhancement on these sites will be designed to draw wildlife closer to developed recreation areas for sightseeing and esthetics without interfering with the areas recreation potential. Plantings of perennials beneficial to wildlife for food or cover will serve as border strips on these sites. Demonstration songbird food plots, forest management and succession control plots near these areas will promote public support of the Corps' wildlife management effort. Intensively used lawn areas will undergo a regular maintenance management schedule including lime, fertilizer and weed killer application and will be clearly distinguished from succession control open areas. Interpretive and educational programs, both passive and active, will be used in these areas to draw attention to wildlife management.

Practice #2. Timber Stand Improvement. Standard forest management practices will usually have beneficial wildlife effects while achieving increased stand vigor and desirable composition. The following will have specific benefits for wildlife utilization:

a. Release cuttings are necessary to open canopy space and reduce competition for desirable food and cover species. Conifers such as white pine, Pinus strobus, eastern hemlock, Tsugua canadensis, and eastern red cedar, Juniperus virginiana, require release on the project where possible.

b. Selective cutting to decrease the basal area of a stand and to allow more growth on the forest floor. Stump sprouting will be encouraged in this manner. Desirable mast trees may be selected and maintained.

c. Removal of den or some wolf trees with unsound limbs or trunks will not be implemented unless visitor safety is a factor; as in developed recreation areas or along access roads or trails.

d. Access roads will be made in remote areas for use by the public, fire suppression equipment, forestry operations, and habitat improvement equipment.

Practice #3. Open Area Maintenance. Open areas will be mowed at least once every three years to keep shrubby species from invading. Mowing half of each scheduled field once in early summer (1 July), and the other half in late summer (15 September) will be done to maintain succulent vegetation and provide food and cover in the fall.

Open area edges can be maintained by thinning. A wide perimeter of tall grass will surround designated mowed areas to provide undisturbed nesting and escape cover which can be mowed once every three years. A 15- foot wide

perimeter surrounding the tall grass will be thinned of everything greater than two inches in diameter breast height (DBH) with brush piled well within the forest edge. A sample maintenance guide for open area management and will be adapted for use on the reservoir.

Practice #4. Hardwood Succession Control. This practice is complementary to open area maintenance, Practice #3. Former open fields that have been reverting to forest will be maintained in a semiopen condition. (Tree species having wildlife food value will be favored). All species greater than four inches DBH will be removed on a two to three year cutting cycle. Trees cut will be placed in small scattered piles for cover and browse. By periodic removal of trees, open field shrubs and vines with value to wildlife, such as juniper, sumac, blueberry, hawthorne, dogwoods, yews, grape, and grasses will be encouraged. This will help maintain overall species diversity and mixture of habitats.

Practice #5. Natural Succession Areas. These areas will be set aside from management activities. Natural succession will be allowed to proceed undisturbed by any form of vegetative manipulation by man.

Practice #6. Artificial Nest Structures. Use of artificial nest boxes will be made when natural cavities are unavailable or in short supply. Wood duck, bluebird, and wren boxes are made available through the Upper Connecticut River Basin; metal predator guards from the sign shop at Barre Falls Dam. Destruction of natural nest cavities in reservoir clearing or timber harvest operations will be compensated for with artificial nest boxes.

Practice #7. Management Roads and Trails. Fire access roads will be constructed, and maintained to provide reasonable access to remote compartment areas. These roads will be adequately blocked to unauthorized vehicular traffic, seeded to a conservation mixture of grasses and sufficiently protected against erosion with water bars and culverts. These access ways will increase edge effect and facilitate travel by wildlife (Plate 5).

Practice #8. Perennial food and cover plantings. These plantings are less expensive to establish and maintain than annual food plots but are also less productive. Hemlock, Tsuga canadensis, is recommended for understory plantings in 10 x 10 spacing in plots 100 x 300 feet to provide winter cover and seed. Plant borders or rows with autumn olive, Elaeagnus umbellata, Atlantic white cedar, Chamaecyperis thyoides, white pine, Pinus strobus, high-bush cranberry, black walnut, Juglans nigra, or other perennials available for sale through the State Forestry Nursery in Voluntown. Orders may be placed with foresters in either Region I or Region II. Plantings will be made in rows or small clumps to provide a maximum edge effect, taking specific site and plant species limitations into account (Table 2).

SECTION 7. ENDANGERED SPECIES

No Federally recognized endangered mammalian, reptilian, amphibian, fish or avian species is known to presently inhabit the reservoir area.

Sightings of Connecticut State Endangered Osprey, Pandion haliaetus, are made occasionally, but these birds appear to be transient. No sightings of breeding pairs have been recorded in the immediate area. The Great Blue Heron, Ardea herodias, designated a State rare bird, is a frequent visitor in the warmer months. No evidence of breeding of the blue heron has been noted.

Measures will be taken to create public awareness of endangered species through the posting of informative material on the animal or other interpretive activities following the sighting. Sightings of endangered species will be reported to the regional State Wildlife Biologist. Ranger and project personnel will continue to participate in the annual cooperative Bald Eagle survey, which was initiated in January 1979 and sponsored by the National Wildlife Federation.

SECTION 8. ECOLOGICAL RELATIONSHIPS AND IMPACTS

General

The implementation of this resource management plan will, by necessity, alter some forest stands and habitat in the reservoir. The manipulation of the project ecosystem will be accomplished in such a manner as to consider the environment as a whole to minimize any adverse effects and to maximize any beneficial ones. An environmental assessment, dated November 1973 was prepared for the operation and maintenance of Northfield Brook Lake. Following is a brief discussion on potential or existing problems affecting the resources and public use of the reservoir.

Soil Erosion

Gully erosion control has been a significant management program within the reservoir. The main erosion area occurs in the old borrow pit on Tract 107, Compartment II, on the steep hillside east of the dam and lake, was inadequately restored and revegetated after dam construction. Resultant accelerated erosion and sedimentation along with other upstream pollution have led to water quality problems in the 8-acre lake.

A total of approximately 17,000 cubic yards of silt and organic material were removed from the lake bottom in the spring of 1973, in the fall and winter of 1974-75, and the falls of 1979 and 1980.

In an effort to restore the old borrow area and limit sedimentation in the lake, a reforestation program and erosion control work was undertaken in cooperation with the Litchfield County Conservation District. Approximately 4,700 conifer seedlings and 650 wildlife shrubs were planted between 1971 and 1979. In June 1978 a small contract was completed for grading and seeding of the large gullies and construction of a 100-foot long sediment basin. In April 1978 several small (less than 1/2-acre) plots were prepared in cooperation with the Litchfield County Conservaton District for experimental plantings of crown vetch, weeping lovegrass, coastal panicgrass, flatpea with perennial rye grass, and bristly locust shrubs to test their potential as conservation plants on adverse growing site conditions. The area can now be used for long term conservation and resource management.

Once the slopes are stabilized the need for future expenditures for sediment removal will be significantly reduced.

Soil erosion from off-reservoir sources and slumping of slopes due to impoundment operations have not been a problem here as at other Corps projects. No silvicultural or management practice which increases erosion will be used. The suitability and limitations of the soil types will be assessed and necessary protective measures taken (buffer strips, erosion bars, regrading/seeding of woods, access roads and trails, etc.).

Effects of Inundation of Forest Stands and Habitat

The adverse effects of flood impoundment operations on forest species and woodland habitats have not been a significant problem in the reservoir. Impoundments may occur several times a year, at any time, for durations of one to four days. However, areas generally inundated are trees along the open field shorelines, lower reaches for the brook, and the developed recreation area.

The vegetative character of frequently flooded areas should be changed to favor flood and ice damage resistant species. Wetland furbearer habitat is now restricted by unstable spring water levels. Artificial methods, such as subimpoundments, to regulate water levels in wetland areas during critical periods would be necessary to compensate for loss of natural wetland habitat.

Mortality of trees has been undramatic but progressive deterioration is evident. This is apparent with the important shade trees in the beach area which are losing their vigor due to inundation. Replanting with desirable and adaptive species will be difficult to establish due to high rates of recreational visitation.

Additional effort is needed to maintain the vigor of existing trees. The selection of planting stock and location of planting sites for replacement trees is critical; the difference of one or two feet in elevation may be very important to transplant survival when considering the effects of various levels of impounded water.

SECTION 9. HUNTING, TRAPPING, FISHING ACCESS AND CONTROL

Hunting of upland game and waterfowl with shotguns only is permissible with State and Federal guidelines on all project lands except in those areas within 500 feet of buildings. Fishing is allowed on all project waters following State regulations. Trapping is allowed on a limited basis to one trapper per season by trapping permit (NED 592) issued by the project manager or park ranger.

Access is through an entrance gate on Route 254 at the beginning of fishing season during daylight hours but is restricted here for the hunting season. Parking and pedestrian access is unrestricted at the dam area and along Route 254.

SECTION 10. INTERPRETIVE PROGRAM

General

The interpretation of our goals, responsibilities, resources and limitations will be an essential part of our natural resource management effort.

Active Interpretive Programming

The recreation resource staff in the basin will make every effort to accommodate requests from the general public for information or scheduled on-project interpretive programming and when possible, to solicit these programs and informational materials of the project in local school systems, libraries, museums, fairs and business establishments.

A schedule of interpretive programming (nature walks, special events, etc.) will be developed each winter for the upcoming season by the park ranger. Requests for film and equipment rental will be made sufficiently in advance. Park technicians will be responsible for running these activities during the summer recreation season guided by outlines provided by the park ranger and project manager.

Wildlife and Forest Management Demonstration Areas

Land management activities near developed recreation areas will draw criticism from time to time through the public's misunderstanding of forestry operations or wildlife/fish habitat improvement techniques. Areas should be set aside near developed recreation lands for forestry/wildlife/fishery improvement demonstration areas which will show the effects of proper management techniques (dramatic differences of before and after effects on the resources and how these areas will look with the passage of time).

Tours of these areas will be given to concerned groups of individuals and self-guiding literature will be made available or adequate signing installed. The assistance of representatives from other interested public agencies, schools and private conservation organizations will be sought in presenting some of the material. As in 1978 and 1979, cooperation will continue to be extended to the Department of Natural Resources Conservation, University of Connecticut, in making reservoir lands available to students to use as an outdoor classroom for independent studies and other course projects.

Passive Interpretive Programming

A self-guided trail will be established and guide literature written.

Display boards at the entrance, beach and picnic areas will be used for Title 36 regulations, project map and other appropriate literature or photos. A portable interpretive display case set up for trailering or transport in a truck bed will be constructed for use in the beach area. Display materials will be changed periodically by ranger personnel.

SECTION 11. SHORT AND LONG RANGE MANAGEMENT PROGRAMS

Short Range

There are three specific programs needing immediate attention and will be scheduled in the first five year annual plan. They will be continued as less intensive programs over the years. The initial plan schedule is shown in Exhibit A.

a. Water Quality. As discussed previously, water quality problems have affected public use of the lake in the past. The sediment control and removal work started in the early 1970's will be evaluated over the coming years and carried on as a continuing program if justified. The use of herbicides will be held to a minimum. Only chemicals that are safe for use around water areas will be used. Close coordination will be continued with interested state and local agencies on pollution sources in the watershed and their effect on the lake. Reconnaissance of the watershed and water quality monitoring will be conducted over the long term.

b. Boundary Marking and Maintenance. To limit the chances of unauthorized use and to facilitate identification of the Government boundary for management practices and public use, a short range program to permanently mark the line, concentrating first on sensitive areas, is being undertaken. This will be followed over the years with periodic inspections and maintenance. Funds will be budgeted as required for service contracts for major line clearing/brush control and reestablishing damaged or lost monuments.

c. Erosion Control. Efforts to control erosion and sedimentation for the reservoir from the primary source in the old borrow area have been undertaken in cooperation with the county conservation district. Over the initial years it will be important to frequently inspect the area, insuring that vegetation has been adequately established, graded slopes are well stabilized, and prompt corrective action taken as needed. Periodic maintenance will be needed over the years to insure against degradation.

Erosion/runoff control will be an integral part of resource management activities, such as harvesting operations, access road construction and trail development. Control measures, including proper layout, improved drainage, minimum vegetation removal, erosion bars and seeding, will be accomplished in all management and contract work before jobs are called complete.

Long Range

These ongoing programs will meet management goals on a continuing basis. They will be accomplished through a variety of management approaches and practices including fishery habitat improvement, wildlife habitat improvement, silvicultural treatments, public recreation, and esthetic development.

SECTION 12. ANNUAL WORK PLANS AND THEIR IMPLEMENTATION

The park ranger, in coordination with the basin manager and project manager, each January will prepare a plan and schedule for management work to be undertaken during the coming year. The plan for the previous year will be updated at the same time to show a record of actual work completed.

The annual work plans will include detailed information on materials and equipment needed, estimates of manhours and costs, dates for starting and completing work, maps and drawings needed, etc. The work plans will be reviewed and approved by the basin manager. Upon approval, action should be started on ordering materials and making advance preparations and coordination.

Plans will be developed for a five year period and updated annually after assessing current conditions, availability of funds, and management needs. The first five year plan is shown in Exhibit A.

SECTION 13. PERSONNEL AND FUNDING REQUIREMENTS TO IMPLEMENT

THE PLAN

The park ranger will divide work time between recreation and management responsibilities and other assigned duties here and at the other NRB reservoirs. Below is a current estimate of average annual field costs for hired labor and contracts for materials and services distributed over the five year cycle. Funds required for natural resource management work will be given equal consideration with other items in the project O&M budget.

PERSONNEL

<u>Position</u>	<u>Duties</u>	<u>Average-Annual M-H/Costs</u>
Park Ranger, (GS-07)	1. Planning, Coordination records mgmt., contracts	40 M-H
	2. Data collection	24
	3. Field work (inspection, super- vision, marking, planting)	60
	4. Training	<u>24</u>
	SUBTOTAL	148 (\$950)
Forestry/or Biological Aide GS-04	1. Data collection	40 M-H
	2. Field Work (inspection, marking, planting, TSI)	40
	3. Other field and office duties as assigned	<u>40</u>
	SUBTOTAL	120 (\$540)
Dam Operator's Helper WG-05	1. TSI, habitat improvement	40 M-H
	2. Planting, erosion control	40
	3. Fire road/break, boundary, maintenance, equip. operator	<u>40</u>
	SUBTOTAL	120 (\$700)
Summer Aide, Min. Wage	1. TSI, habitat improvement	40 M-H
	2. Planting, erosion control	40
	3. Fire road/break, trail maintenance	<u>40</u>
	SUBTOTAL	120 (\$375)

Materials and Services

Supplies (drafting, I&E, paint, marking gum, signs, etc.)	\$ 300
Materials (plants, seeds, fertilizer, culverts, etc.)	800
Equip. rental (dozer, grader, disk plow, P/U truck, etc.)	1,500
Contract services (tree pruning, wood products, boundary maintenance, mowing)	<u>1,000</u>
TOTAL	\$3,600

The above annual cost estimates do not include: 1. applicable costs of project-owned vehicles, equipment and tools; 2. mowing and trimming and general maintenance of the recreation area; 3. special projects.

SECTION 14

EXHIBITS AND MAPS

FOR

NORTHFIELD BROOK

EXHIBIT A

FIVE YEAR ANNUAL PLAN

CY 80-84

An initial short range 5-year schedule for implementing this resource management plan is set out below. This schedule will be updated on a 5-year cycle and the plan revised as needed. Each January an annual work plan for the coming season will be prepared and approved per Section 11.

CY 80

	<u>Work Item</u>	<u>Date</u>
1	Prepare mgmt. prescriptions, Compartments I, II, IV	June
2	Boundary line marking/sign, planting (complete)	Apr-June
3	Fuelwood sale, Compartment IV-B	June
4	TSI cordwood permits, Compartments I & IVA	ATP
5	Succession control mowing, Compartment IIB	July
6	Hardwood control, Compartment IIA	June-Aug

CY 81

1	Construct Mgmt. access roads/trails (equipment rental), Compartments I, II, IV	May-June
2	Maintenance/cleaning of sediment basin, Compartment IIB	May-June
3	Hiking trail maintenance (seeding, pruning, marking, erosion control), Compartments I, II, IV	Apr-June
4	TSI cordwood permits, Compartments I & IV	ATP
5	Shade tree pruning, Compartment III	April

FY 82

1	Remarking/maintenance of boundary line	Apr-June
2	Replanting of borrow area as needed, Compartment IIB	April
3	Succession control mowing, Compartment IIB	July
4	Hardwood control, Compartment IIA	June-Aug
5	Fuelwood sale, Compartments I & IV	Aug
6	Sale of hemlock and pine, Compartments I & IV	Aug

EXHIBIT A (Cont'd)

FY 83

- | | | |
|---|---|----------|
| 1 | Hiking trail/mgmt. road maintenance as needed, Compartments I, II, & IV | Apr-June |
| 2 | Fishery habitat improvements to lake and brook, Compartment III | Nov |
| 3 | Remove sediment deposits as needed, Compartment III | Nov |

FY 84

- | | | |
|---|--|----------|
| 1 | Maintenance/cleaning of sediment basin and graded slopes in borrow area, Compartment IIB | June |
| 2 | Maintenance to hiking trail and mgmt. access roads Compartments I, II & IV | May-June |
| 3 | Revise 5-year plan | Dec |

LEGEND

S.A.F. COVER TYPES

- REFORESTED
- OPEN TO BRUSHY AREAS
- HEMLOCK
- SUGAR MAPLE - BEECH - YELLOW BIRCH
- SUGAR MAPLE
- WHITE OAK - RED OAK - HICKORY

HEIGHT CLASSES

- 1 0' - 20'
- 2 21' - 40'
- 3 41' - 60'
- 4 61' - 80'

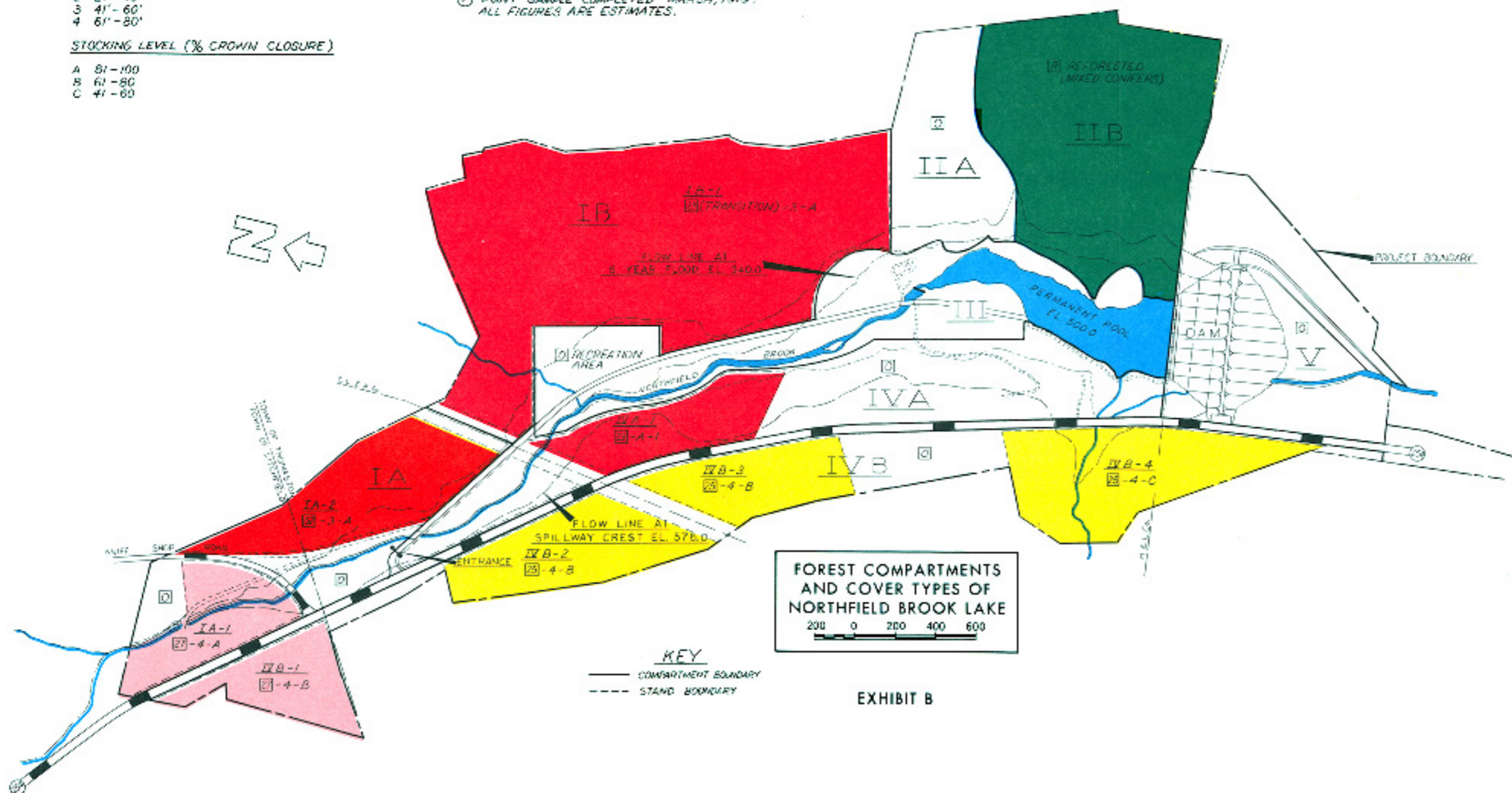
STOCKING LEVEL (% CROWN CLOSURE)

- A 81-100
- B 61-80
- C 41-60

STAND DATA^①

STAND NO.	AREA (ACRES)	BASAL AREA PER ACRE	BOARD FOOT VOLUME	SITE INDEX
IA-1	7	94 SQ. FT.	7800 B. F.	69
IA-2	10	89	2047	71
IB-1	42	86	4387	48
IVA-1	10	87	3412	54
IVB-1	6	73	1780	61
IVB-2	9	64	2080	64
IVB-3	7	71	3900	72
IVB-4	12	59	4940	84

① POINT SAMPLE COMPLETED MARCH, 1979.
ALL FIGURES ARE ESTIMATES.



MANAGEMENT	COMPARTMENTS
COMPARTMENT I (61 ACRES)	
IA (19 ACRES)	RESERVE FOREST LAND (WILDLIFE MANAGEMENT)
IB (42 ACRES)	
COMPARTMENT II (38 ACRES)	
IIA (10 ACRES)	RESERVE FOREST LAND (WILDLIFE MANAGEMENT)
IIB (28 ACRES)	
COMPARTMENT III (23 ACRES)	RECREATION - INTENSIVE USE
COMPARTMENT IV (164 ACRES)	
IVA (26 ACRES)	RESERVE FOREST LAND (WILDLIFE MANAGEMENT)
IVB (138 ACRES)	
COMPARTMENT V (22 ACRES)	PROJECT OPERATIONS

TOTAL FEE: 208 ACRES
FLOWAGE EASEMENT: 27 ACRES

